LARGE SCALE MODEL RAILWAY ENGINEERING

Notes on building the brake valve

During the past couple of months I have presented drawings for building a mechanical and hydrostatic lubricator. This issue starts my next project. The enclosed drawing shows the construction of a variable pressure brake valve that I used on the Climax. Although the valve was designed for steam operated brakes it will also work fine on air if one is careful in making the balls seat air tight. A little bit of explanation is in order to explain how it works before we get into some construction notes.

The valve is made of a brass block with a couple of stainless steel balls, a spring and a couple of pistons. Steam or air enters into the main chamber via the 1/4 MTP threaded port. When the cam (MP-0203) is in the position shown on the drawing, the spring is compressed holding the ball closed blocking the flow pass the ball. As the cam is rotated in a clockwise direction the spring force is reduced until the pressure on the ball overcomes the spring force pressurizing the area on the other side of the ball. This area is connected via the 3/16 MTP port to the brake cylinders. When the brakes come on the pressure in the brake line start to climb putting additional back pressure on the ball. When this back pressure and the spring force on the ball equals the pressure on the inlet side of the ball the ball closes shutting off flow. From this it can be seen that the less the spring load the greater the line pressure has to be to balance the inlet pressure. The spring force is varied by the position of the cam, the further the cam is rotated in the clockwise direction the less the spring will be compressed and thus the high the line pressure will be. When the cam is rotated from the position shown on the drawing in a counter clockwise direction the cam will contact the brake release piston (MP-0205) thus forcing the 1/8 ball off of its seat releasing any pressure in the brake line. Spring (MP-0208) forces the ball and piston closed when cam is rotated to the off position (position shown on the drawing).

The secret of making the valve work correctly is in making the balls seat tight. As in my other projects I use a piloted counterbore to make all ball seats. This method has worked well. The regulator piston (MP-0204) should be a very tight sliding fit in the block to prevent leaking when the brakes are applied. Notice there is a couple of small groove to aid in this sealing. The release piston (MP-0205) should be a little loose in its bore to allow the brake pressure to bleed off around the piston when the ball is off the seat. A gauge port is provided for a pressure gauge if so desired to monitor the brake line pressure. If a gauge is not used the port can be plugged. One has to experiment with the springs to get the brake pressure range one desires.

Next month I will start detailing the parts.

APPROVED SUPPLIER	SUPP SPEC
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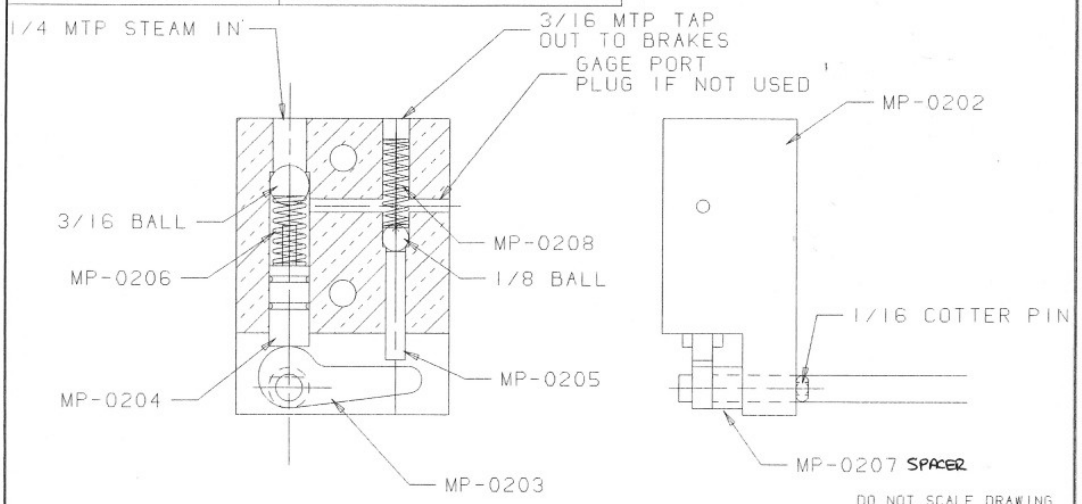

DO NOT SCALE DRAWING
TOLERANCES
UNLESS OTHERWISE SPECIFIED:
ANGLES ± 1°
DECIMALS: (3 PLACE) ±.005
(2 PLACE) ±.015

MATERIAL: –

SYM	ECO	REVISION	BY	DATE
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PIKE LAKE & EASTERN
Hartford Shops

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TA	2/1/99	–	
CKD –	DATE –	DWG –	

TITLE: BRAKE VALVE ASSM.

NO. MP-201

APPROVED SUPPLIER	SUPP SPEC
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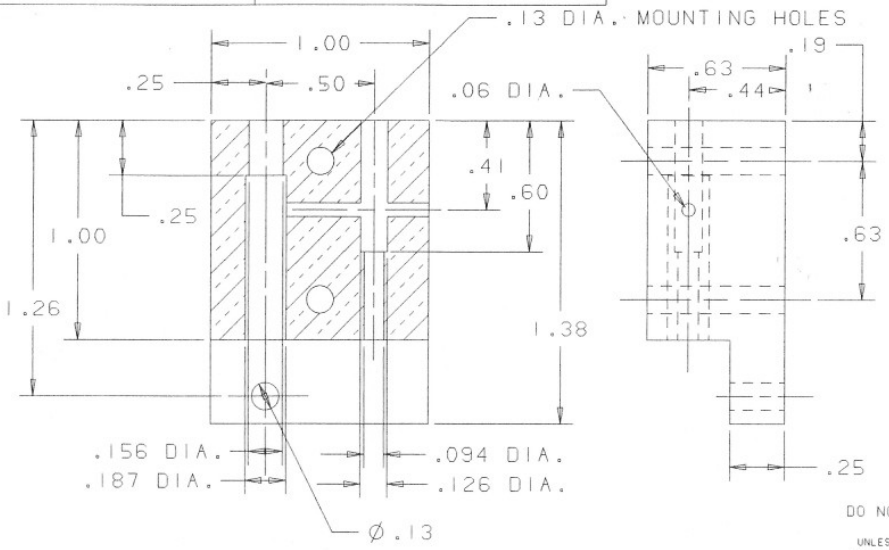

DO NOT SCALE DRAWING
TOLERANCES
UNLESS OTHERWISE SPECIFIED:
ANGLES ± 1°
DECIMALS: (3 PLACE) ±.005
(2 PLACE) ±.015

MATERIAL: BRASS

SYM	ECO	REVISION	BY	DATE
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DWN	DATE	FILE	SCALE
TA	3/20/99	–	
CKD	DATE	DWG	
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TITLE	NO.
BRAKE VALVE BODY	MP-202

APPROVED SUPPLIER	SUPP SPEC
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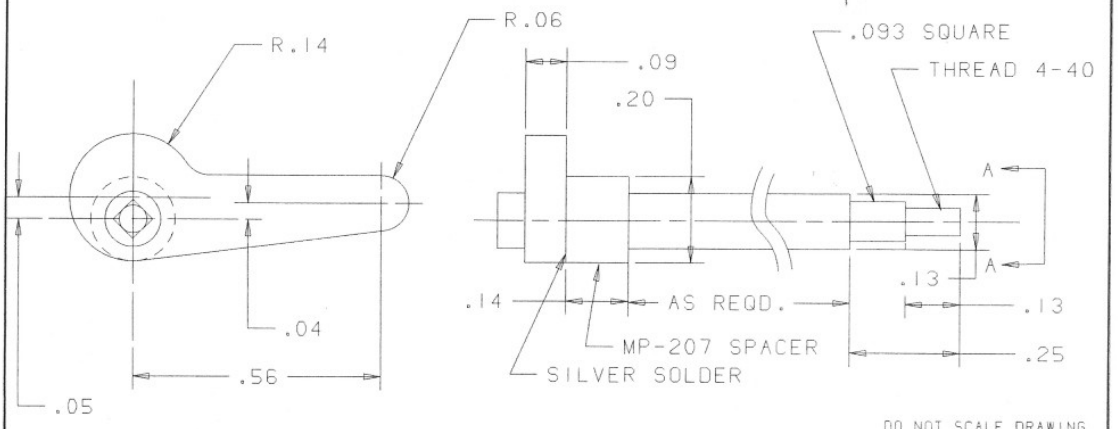

SECTION A-A

DO NOT SCALE DRAWING
TOLERANCES
UNLESS OTHERWISE SPECIFIED:
ANGLES ±1°
DECIMALS: (3 PLACE) ±.005
(2 PLACE) ±.015

MATERIAL: BRASS

SYM	ECO	REVISION	BY	DATE
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DWN	DATE	FILE	SCALE
TA	3/20/99	_	
CKD	DATE	DWG	
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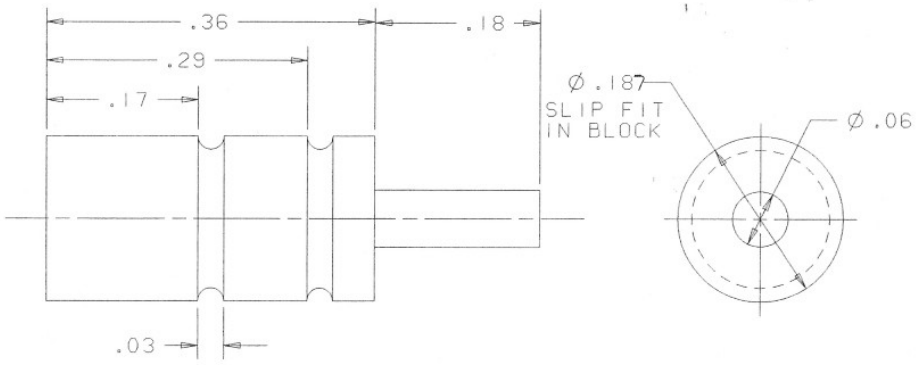
TITLE: BRAKE VALVE CAM

NO. MP-203

APPROVED SUPPLIER	SUPP SPEC
-	-



BRAKE EDGES

DO NOT SCALE DRAWING
TOLERANCES
UNLESS OTHERWISE SPECIFIED:
ANGLES ± 1°
DECIMALS: (3 PLACE) ±.005
(2 PLACE) ±.015

MATERIAL:- STAINLESS

PIKE LAKE & EASTERN
Hartford Shops

DWN	DATE	FTLE	SCALE
TA	3/20/99	-	
CKD	DATE	DWG	
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TITLE: BRAKE VALVE REG. PISTON
NO. MP-204

SYM	ECO	REVISION	BY	DATE
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APPROVED SUPPLIER	SUPP SPEC
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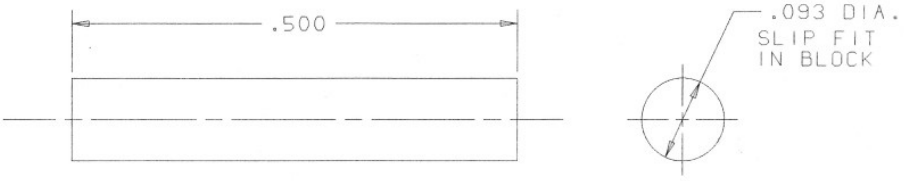

BRAKE EDGES

DO NOT SCALE DRAWING
TOLERANCES
UNLESS OTHERWISE SPECIFIED:
ANGLES ± 1°
DECIMALS: (3 PLACE) ±.005
(2 PLACE) ±.015

MATERIAL:– STAINLESS

SYM	ECO	REVISION	BY	DATE
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PIKE LAKE & EASTERN
Hartford Shops

DWN	DATE	TITLE	SCALE
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CKD	DATE	DWG	
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TITLE
BRAKE VALVE REL. PISTON

NO.
MP-205

APPROVED SUPPLIER	SUPP SPEC
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SPRING DATA:

.155 OD.
.312 LONG
.020 WIRE DIA.
7 ACTIVE COILS

DO NOT SCALE DRAWING
TOLERANCES
UNLESS OTHERWISE SPECIFIED:
ANGLES ±1°
DECIMALS: (3 PLACE) ±.005
(2 PLACE) ±.015

MATERIAL: STAINLESS

SYM	ECO	REVISION	BY	DATE
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PIKE LAKE & EASTERN
Hartford Shops

DWN	DATE	FILE	SCALE
TA	3/20/99	_	
CKD	DATE	DWG	
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TITLE: BRAKE VALVE SPRING

NO. MP-206

APPROVED SUPPLIER	SUPP SPEC
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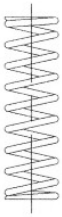

SPRING DATA:

.125 OD.
.375 LONG
.020 WIRE
7 ACTIVE COILS

DO NOT SCALE DRAWING
TOLERANCES
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ANGLES ± 1°
DECIMALS: (3 PLACE) ±.005
(2 PLACE) ±.015

MATERIAL: STAINLESS

SYM	ECO	REVISION	BY	DATE
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PIKE LAKE & EASTERN
Hartford Shops

DWN	DATE	FILE	SCALE
TA	3/20/99	–	
CKD	DATE	DWG	
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TITLE: BRAKE VALVE REL. SPRING

NO. MP-208